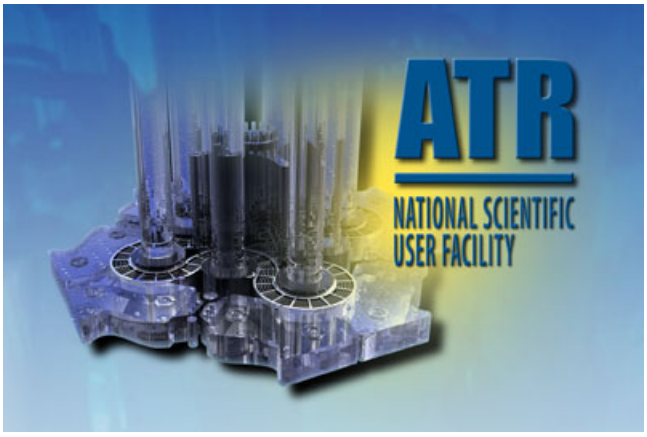


The ATR is expanding its role as a national scientific user facility by partnering with four universities on new research projects.

National nuclear facility picks university experiment partners

by Teri Ehresman, *INL Communications & Public Affairs*

Idaho's one-of-a-kind research reactor will now play a role in university research on nuclear energy and reactor safety at schools from Utah, California, Wisconsin and Massachusetts.

Workers install the initial loops in the Advanced Test Reactor where the university experiments will take place.

A recent competition selected key nuclear research experiments for the Advanced Test Reactor National Scientific User Facility at the U.S. Department of Energy's Idaho National Laboratory. Teams representing Utah State University, Massachusetts Institute of Technology, University of California-Santa Barbara and the University of Wisconsin were chosen.

Todd Allen, ATR NSUF scientific director, said experiments are selected either for irradiation in a test reactor or for post-irradiation examination. In addition, two other universities have been named as research partners with the User Facility.

"The four new university-led projects show great promise for advancing the safety and performance of nuclear energy systems," Allen said. "These projects are based on advancing light-water reactors, high-temperature gas-cooled reactors and fast reactors."

Nuclear power reactors generate electricity by using heat from the fission of uranium fuel to evaporate water into steam and power a turbine. In addition to creating heat, the fission process also releases neutron radiation. The radiation can gradually degrade materials used in the protective fuel cladding and the reactor's core vessel, where the fission takes place. Cracks can form along the grains of the material, or the absorption of neutrons may cause swelling.

The Advanced Test Reactor allows scientists to find out which materials can withstand such an extreme environment. Researchers can insert samples into the ATR and pelt the material with neutrons to simulate the radiation in a nuclear power reactor. In 2007, the U.S. Department of Energy opened the reactor to the academic community by establishing the ATR National Scientific User Facility.

The recently selected projects join five experiments the ATR NSUF selected in 2008 for testing. Four of the 2008 projects will be tested in the Advanced Test Reactor — two are scheduled for placement in the reactor in February and two others later this year — and one has been irradiated in the MIT Reactor, a partner facility of the User Facility.

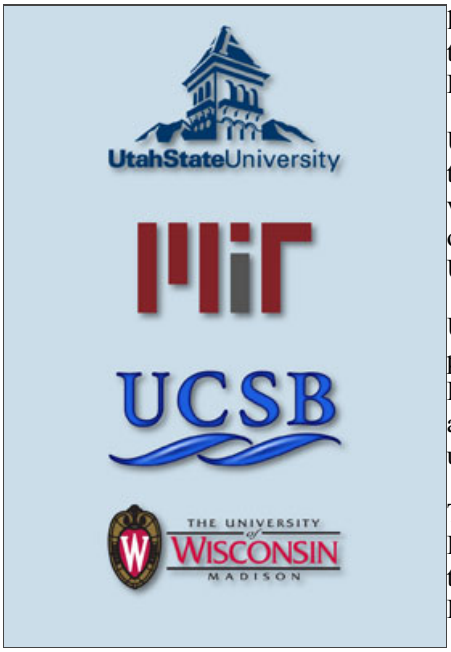
"The INL strongly believes in establishing partnerships with existing facilities to optimize the experimental process. The two new partners were selected for this purpose and will be integral members of the NSUF," Allen said.

The ATR NSUF supports U.S. leadership in nuclear science and technology. By attracting new research users — universities, laboratories and industry — the ATR supports basic and applied nuclear research and development, advancing the nation's energy security needs.

The four new research projects are:

Utah State University -- led by Dr. Heng Ban, the project studies the radiation response of materials consisting of combinations of aluminum and hafnium. The material specimens to be irradiated are part of a unique, patent pending design. These materials potentially can change the local characteristics of a reactor experiment, allowing an improved flexibility to tailor experiments in the ATR to a customer's needs. The test will determine the long-term stability of these aluminum-hafnium alloys in a reactor environment. Collaborating institutions are Idaho National Laboratory and University of Nevada-Las Vegas.

Massachusetts Institute of Technology -- led by Dr. Mujid Kazimi, the project will study the in-reactor behavior of a new silicon carbide-based material that could be used to improve the fuel



Logos for the four universities participating in the new research projects.

lifetime in light water reactors. If the experiment is successful, these longer-life fuels would improve the economic performance of nuclear systems. The experiment will be conducted in the MIT Reactor, an NSUF partner facility. There are no collaborating institutions.

University of California-Santa Barbara -- led by Dr. Robert Odette, the project will establish the ability to study the long-term properties of reactor pressure vessel steels. This project will be valuable in determining the safe operation of light water reactor pressure vessel materials for lifetimes out to 80 years. This is a critical need for the nation's energy stability. Collaborating institutions are University of California-Berkeley and Oak Ridge National Laboratory

University of Wisconsin -- led by Dr. Yong Yang, this will be a post-irradiation examination project, studying the radiation performance of advanced materials for high-temperature reactors. Determining that the test materials ultimately show good stability in the reactor environment would allow even higher temperature reactor operations, improving reactor efficiency and expanding the uses for high-temperature heat. There are no collaborating institutions.

The NSUF new partner facilities are the University of Michigan Irradiated Materials Testing Laboratory and the Wisconsin Characterization Lab for Irradiated Materials. They will support testing of irradiated materials. Also, the Michigan Ion Beam Laboratory and Wisconsin Ion Beam Laboratory will support studies on radiation resistance of materials.

Feature Archive